  
Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37384-2000

May 22, 2006

U.S. Nuclear Regulatory Commission  
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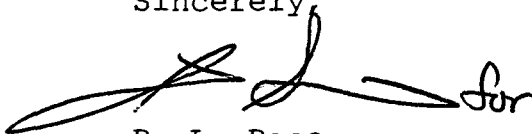
10 CFR 50.73

Gentlemen:

**TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT (SQN)  
UNIT 2 - DOCKET NO. 50-328 - FACILITY OPERATING LICENSE  
DPR-79 - LICENSEE EVENT REPORT (LER) 50-328/2006-001-00**

The enclosed LER provides details concerning an automatic turbine and reactor trip resulting from actuation of the main generator neutral overvoltage relay. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(iv) as an event that resulted in the automatic actuation of engineered safety features, including the reactor protection system.

Sincerely,



P. L. Pace  
Manager, Site Licensing and  
Industry Affairs

Enclosure

cc (Enclosure):

INPO Records Center  
Institute of Nuclear Power Operations  
700 Galleria Parkway, SE, Suite 100  
Atlanta, Georgia 30339-5957

IE22

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

## 1. FACILITY NAME

Sequoyah Nuclear Plant (SQN) Unit 2

## 2. DOCKET NUMBER

05000328

## 3. PAGE

1 OF 5

## 4. TITLE

Reactor Trip Resulting From Actuation Of The Main Generator Neutral Overvoltage Relay

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	22	2006	2006	- 001 -	00	05	22	2006		05000
										05000

## 9. OPERATING MODE

1

## 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)

- |   |   |  |   |
|---|---|--|---|
| <input type="checkbox"/> 20.2201(b)         | <input type="checkbox"/> 20.2203(a)(3)(i)   | <input type="checkbox"/> 50.73(a)(2)(i)(C)             | <input type="checkbox"/> 50.73(a)(2)(vii)     |
| <input type="checkbox"/> 20.2201(d)         | <input type="checkbox"/> 20.2203(a)(3)(ii)  | <input type="checkbox"/> 50.73(a)(2)(ii)(A)            | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |
| <input type="checkbox"/> 20.2203(a)(1)      | <input type="checkbox"/> 20.2203(a)(4)      | <input type="checkbox"/> 50.73(a)(2)(ii)(B)            | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |
| <input type="checkbox"/> 20.2203(a)(2)(i)   | <input type="checkbox"/> 50.36(c)(1)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(iii)              | <input type="checkbox"/> 50.73(a)(2)(ix)(A)   |
| <input type="checkbox"/> 20.2203(a)(2)(ii)  | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x)       |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.36(c)(2)        | <input type="checkbox"/> 50.73(a)(2)(v)(A)             | <input type="checkbox"/> 50.73(a)(4)          |
| <input type="checkbox"/> 20.2203(a)(2)(iv)  | <input type="checkbox"/> 50.46(a)(3)(ii)    | <input type="checkbox"/> 50.73(a)(2)(v)(B)             | <input type="checkbox"/> 73.71(a)(5)          |
| <input type="checkbox"/> 20.2203(a)(2)(v)   | <input type="checkbox"/> 50.73(a)(2)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(v)(C)             | <input type="checkbox"/> OTHER                |
| <input type="checkbox"/> 20.2203(a)(2)(vi)  | <input type="checkbox"/> 50.73(a)(2)(i)(B)  | <input type="checkbox"/> 50.73(a)(2)(v)(D)             |   |

Specify in Abstract below  
or in NRC Form 366A

## 12. LICENSEE CONTACT FOR THIS LER

## FACILITY NAME

J. W. Proffitt, Nuclear Engineer

## TELEPHONE NUMBER (Include Area Code)

423-843-6651

## 13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

## 14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO15. EXPECTED  
SUBMISSION  
DATE

MONTH

DAY

YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On March 22, 2006, at 1624 Eastern standard time with Unit 2 operating at 100 percent power, the turbine tripped followed by a reactor trip as a result of operation of the main generator neutral overvoltage relay. The immediate cause of this event was attributed to an isolated phase bus duct gasket that came loose and caused a ground. The ground was on the electrical bus leading from the main generator to the 'C' phase main transformer. The gasket provided a path for electrical leakage to ground that was detected by the neutral overvoltage relays. The ground resulted in actuation of the main generator neutral overvoltage relay. The actuation of the relays tripped the main transformer resulting in subsequent turbine and reactor trips. The relays actuated, as designed, to prevent damage to other components. The cause of this event is ineffective corrective action of a previous similar event. The previous corrective actions from the 1995 event focused on methods to ensure retention of the gasket and did not focus on long-term equipment reliability. The Unit 2 bus duct gasket was reinstalled with additional tie-wraps to support the gasket and the bus was returned to service. The bus duct has been modified to no longer require the gasket on the Unit 1 bus ducts. The Unit 2 bus duct will be modified to remove the gasket during the upcoming refueling outage.

# LICENSEE EVENT REPORT (LER)

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Sequoyah Nuclear Plant (SQN) Unit 2	05000328	YEAR	SEQUENTIAL NUMBER	REVISION	2 OF 5
		2006 --	001 --	00	

17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

I. PLANT CONDITION(S)

Unit 2 was operating at 100 percent power when the reactor trip occurred.

II. DESCRIPTION OF EVENT

A. Event:

On March 22, 2006, at 1624 Eastern standard time (EST), the turbine tripped followed by a reactor trip as a result of operation of the main generator neutral overvoltage relay (EISS code AIT). The immediate cause of this event was attributed to an isolated phase bus duct gasket (EISS code FK) that came loose and caused a ground. The ground was on the electrical bus leading from the main generator (EISS code EL) to the 'C' phase main transformer. The gasket provided a path for electrical leakage to ground that was detected by the neutral overvoltage relays. The ground resulted in actuation of the main generator neutral overvoltage relay. The actuation of the relays tripped the main transformer resulting in subsequent turbine and reactor trips. The relays actuated, as designed, to prevent damage to other components.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None.

C. Dates and Approximate Times of Major Occurrences:

March 22, 2006 at 1624 EST A turbine trip and subsequent reactor trip were initiated because of the loss of main transformer.

March 22, 2006 at 1630 EST Operators initiated manual control of auxiliary feedwater (AFW) in accordance with procedures.

March 22, 2006 at 1645 EST Operators increased AFW flow to ensure heat sink requirements met

March 22, 2006 at 1735 EST Operations personnel stabilized the plant in a safe condition in Mode 3.

D. Other Systems or Secondary Functions Affected:

No other systems or secondary functions were affected by this event.

## LICENSEE EVENT REPORT (LER)

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

E. Method of Discovery:

The turbine and reactor trips were annunciated on the main control room panels.

F. Operator Actions:

Control room personnel responded as prescribed by emergency procedures. They promptly diagnosed the plant condition and took actions necessary to stabilize the unit in a safe condition and maintained the unit in hot standby, Mode 3.

G. Safety System Responses:

The plant responded to the turbine and reactor trips as designed.

### III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of this event was attributed to an isolated phase bus duct gasket that came loose and caused a ground. The ground was on the electrical bus leading from the main generator to the 'C' phase main transformer. The gasket provided a path for electrical leakage to ground that was detected by the neutral overvoltage relays. The ground resulted in actuation of the main generator neutral overvoltage relay. The actuation of the relays tripped the main transformer resulting in subsequent turbine and reactor trips. The relays actuated, as designed, to prevent damage to other components. The designated spare transformer was in service as the 'C' phase main transformer.

B. Root Cause:

The root cause of the event was ineffective corrective action of a previous similar event. As a result of a reactor trip in 1995, a preventative maintenance (PM) instruction was revised to periodically inspect gaskets and bus alignments at the transformer doghouses and rework or replace as required. The previous corrective focused on methods to ensure retention of the gasket and did not evaluate long-term equipment reliability.

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1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

## C. Contributing Factor:

The gasket used for the application to electrically isolate the isophase bus housing from the low-voltage bushing enclosure was not the best selection for the application. The PMs did not include verification that the gaskets were secured by two independent means as specified in the vendor manual. The PM work instructions are confusing and lacked sufficient detail to ensure proper inspection.

## IV. ANALYSIS OF THE EVENT

The plant systems responded to the main generator trip, turbine trip, and reactor trip as designed. The reactor coolant system (RCS) average temperature was near its program value 578 degrees F before the reactor trip. Following the reactor trip, the loss of nuclear heat generation and the introduction of cold auxiliary feedwater resulted in a decrease in RCS average temperature to 540.3 degrees F. By procedure, with RCS Tavg less than 547 degrees F, AFW flow is manually reduced in accordance with plant procedures. After the initial transient, the secondary heat sink was adequately maintained to ensure removal of primary system decay heat with one steam generator (SG) level greater than 10 percent narrow range and the other SG's remaining above 77 percent wide-range level. RCS temperature was restored to its no-load value of 547 degrees F after the reactor trip. Emergency boration was not required based on the shutdown margin requirements. Therefore, RCS temperature remained within technical specification and safety analysis report requirements during the event.

The plant safety system responses during and after the unit trip were bounded by the responses described in the SQN Final Safety Analysis Report. The unit was stabilized in Mode 3.

## V. ASSESSMENT OF SAFETY CONSEQUENCES

Based on the above "Analysis of The Event," this event did not adversely affect the health and safety of plant personnel or the general public.

## VI. CORRECTIVE ACTIONS

### A. Immediate Corrective Actions:

Control room personnel responded as prescribed by emergency procedures. They promptly diagnosed the plant condition and took action necessary to stabilize the unit in a safe condition. The Unit 2 bus duct gasket was reinstalled and the bus was returned to service.

# LICENSEE EVENT REPORT (LER)

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		2006 --	001 --	00	

17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

## B. Corrective Actions to Prevent Recurrence:

The bus duct was modified to no longer require the gasket. The gasket was removed from Unit 1 bus ducts and will be removed from the bus ducts on Unit 2 during the upcoming refueling outage.

## VII. ADDITIONAL INFORMATION

### A. Failed Components:

The gasket material part number 868A8151H36 was manufactured by Westinghouse.

### B. Previous LERs on Similar Events:

A review of previous reportable events identified a similar event that resulted in a reactor trip that was initiated from a loose gasket causing a short. LER 50-328 / 95002 addressed a reactor trip that resulted from a neoprene gasket coming loose and causing a phase-to-ground fault. The gasket was replaced and sealed with sealant to secure the gasket in place and an independent means (tie-wraps) were added to support the gasket. Additional corrective actions included inspection of the other Unit 2 transformers and revising a PM to periodically inspect gaskets and bus alignments at the transformer doghouses and rework or replace as required.

### C. Additional Information:

None.

### D. Safety System Functional Failure:

This event did not result in a safety system functional failure in accordance with 10 CFR 50.73(a)(2)(v).

### E. Loss of Normal Heat Removal Consideration:

This condition did not result in a loss of normal heat removal.

## VIII. COMMITMENTS

None.